**Ksp for Calcium Hydroxide Lab Handout**

*Overview*

In this demo, you will be investigating the solubility of a substance and calculating the equilibrium value, Ksp. To do this, you will be performing a simple titration of lime water (which is a saturated solution of Ca(OH)2) with HCl and calculating the concentrations of ions in solution.

*Procedure*

1. Into each of 3 wells, add 30 drops of lime water and 2 drops of phenolphthalein and carefully mix by swirling
2. While swirling, slowly add 0.1M HCl drop by drop until the pink color disappears. Repeat for each well
3. Using the average number of drops of HCl required and the calculations below, you should be able to determine an approximate Ksp value for calcium hydroxide
4. Pour down the drain and rinse with copious amounts of H2O

*Observations*

**Table 1.0- Recorded volumes (# drops) used in each trial**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Well #1** | **Well #2** | **Well #3** |
| Volume of Ca(OH)₂ (# of drops) |  |  |  |
| Volume of 0.1M HCl (# of drops) |  |  |  |

*Reactions*

Ca(OH)2(s) 🡨🡪 Ca2+(aq) + 2OH-(aq)

Ca2+(aq) + 2OH-(aq) + 2H+(aq) + 2Cl-(aq) 🡪 Ca2+(aq) + 2H2O(l) + 2Cl-(aq)

*Data Analysis*

**Example**

1. Calculate the average number of drops of HCl used.

**Ave Drops = (Test 1 + Test 2 + Test 3) / 3**

**= (16 + 17 +18) / 3 =17 drops**

1. Calculate the [OH¯] by using the formula:

**Ma x Va = Mc x Vc**

**( [H+] ) (# of drops) = ( [OH-] ) (# of drops)**

**( 0.1M ) ( 17 drops ) = ( [OH-] ) (30 drops)**

**[OH-] = 0.057 M**

1. Determine the molarity of the calcium ion.

**[Ca2+] = 0.5 [OH-] = 0.5 (0.057 M) = 0.28 M**

1. Calculate the Ksp of calcium hydroxide using the formula:

**Ksp = [Ca2+] [OH-]2 = (0.28 M)(0.057 M)2**

**Ksp = 9.1 x 10-5**

1. Calculate the molarity of a saturated Ca(OH)2 solution in moles/liter.

**[Ca(OH)2] = [Ca2+] = 0.28 M**

1. Calculate the concentration of a saturated Ca(OH)2 solution in g/L.

**( [Ca(OH)2] )(MM) = (0.28 M)(74 g/mol) = 2.07 g/L**

**Your Calculations**